

WHAT IS CLAIMED:

1. A synthetic material comprising a network polymer
wherein
said synthetic material has a set of less than 0.1% after having been stretched to 300% of its original length for 10 minutes.

2. A synthetic material comprising a network polymer
said polymers comprising a first monomer and a second monomer,
said first monomer being a C₃ to C₂₀olefin,
said second monomer being a C₅ to C₃₀ olefin,
[*m*] being the relative amount of *m* dyads in said polymers
[*r*] being the relative amount of *r* dyads in said polymers
wherein
the isotacticity I of said polymers is between 25% and 80% where I is [mmmm], the
mmmm pentad concentration of said polymers,
k is at least 0.2, k being defined by

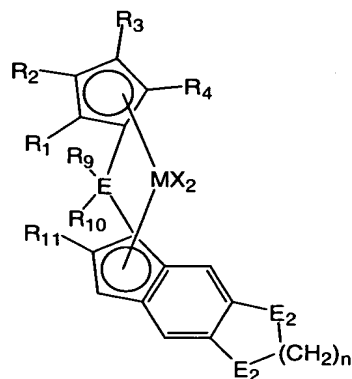
$$k = \frac{[mrrm] - [m]^2(1 - [m])^2}{[m](1 - [m]) - [m]^2(1 - [m])^2}$$
 where [mrrm] is the mrrm pentad concentration of said polymers, and
a fraction of the polymer side chains is connected to form inter-molecular bonds.

3. A synthetic material according to Claim 2
wherein
said first monomer is propene.

4. A synthetic material according to Claim 2 or Claim 3
wherein
said second monomer is a diene.

5. A synthetic material according to Claim 4
wherein
said second monomer is 7-methyl-1,6-octadiene.

6. A process for synthesizing a network polymer comprising the steps of
- providing said first monomer being a C₃ to C₂₀olefin
 - providing a second monomer being a C₅ to C₂₀ olefin
 - providing a catalyst of the formula



where R₁ through R₈ refer to linear or branched C₁ to C₁₀ alkyl, 5- to 7-linked cycloalkyl which in its turn, can carry one or several C₁ to C₆ alkyl residues as substituents, C₆ to C₁₈ arylalkyl or alkylaryl, in which case R₁/R₂, R₃/R₄, R₆/R₇ can be partially or simultaneously integrated into 5- to 7-linked cycloalkyl or aryl rings fused thereto

R₉ and R₁₀ refer to C₁ to C₈ alkyl, 4- to 7-linked cycloalkyl, aryl in which case R₉, R₁₀ can jointly with E form a 4- to 7-linked cycloalkyl

M refers to titanium, zirconium, hafnium, vanadium, niobium, tantalum

X refers to a halogen or C₁ to C₈ alkyl, aryl, benzyl

E refers to carbon, silicon, germanium, or 1,2-ethyl, 1,3-propyl, or 1,4-butyl,

E₂ refers to methyl, oxygen or sulphur, and n is 1 or 2.

- providing an activator
 - polymerising said first monomer and said second polymer to a random copolymer
 - cross-linking said copolymer to form a network polymer
7. A process for synthesizing a network polymer according to Claim 6 wherein
- said step of cross-linking involves cross-linking the copolymers by means of ionising radiation.